Attorney Docket No. 9409-3 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Freese et al. Confirmation No.: 8346
Serial No.: 10/661,917 Examiner: Daborah Chacko Davis
Filed: September 11, 2003 Group Art Unit: 1795
For: METHODS FOR MASTERING MICROSTRUCTURES THROUGH A SUBSTRATE USING NEGATIVE PHOTORESIST

January 7, 2008

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION–37 C.F.R. § 41.37)

1. Transmitted herewith is the APPEAL BRIEF for the above-identified application, pursuant to the Notice of Appeal filed on November 8, 2007 and the Notice f Panel Decision from Pre-Appeal Brief Review mailed November 29, 2007.

2. This application is filed on behalf of
   ☒ a small entity.

3. Pursuant to 37 C.F.R. § 41.20(b)(2), the fee for filing the Appeal Brief is:
   ☒ small entity $255.00
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Respectfully submitted,

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CERTIFICATION OF TRANSMISSION

I hereby certify that this correspondence is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4) to the U.S. Patent and Trademark Office on January 7, 2008.

Susan E. Freedman
Date of Signature: January 7, 2008

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APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 41.37

Sir:

This Appeal Brief ("Brief") is filed pursuant to the "Second Notice of Appeal to the Board of Patent Appeals and Interferences", the "Second Pre-Appeal Brief Request for Review" electronically transmitted on November 8, 2007, and the "Notice of Panel Decision from Pre-Appeal Brief Review" mailed November 29, 2007.

Real Party In Interest

The real party in interest is assignee Bright View Technologies, Inc., by assignment recorded on September 11, 2003 at Reel 014502, Frame 0317.

Related Appeals and Interferences

Appellants are aware of no appeals or interferences that would be affected by the present appeal.

Status of Claims

Claims 1, 3-13 and 15-18 remain pending in the present application as of the filing date of this Appeal Brief and are on appeal herein. Claims 1, 3-13 and 15-18 stand rejected in an Office Action mailed October 18, 2007 (hereinafter "Office Action"). Claims 2, 14 and 19-105 are canceled. The attached Appendix A presents the claims at issue as rejected in the Office Action. Appellants wish to note that the Office Action

Summary of the Office Action indicates that Claims 21-30, 32-35, 38-42, 44 and 45 also remain pending. However, this is not the case, as these claims were canceled in an Amendment After Final Action dated May 22, 2007.

Status of Amendments

A final Office Action was issued in this application on May 3, 2007 and, in response, Claims 2, 14 and 19-105 were canceled in an Amendment After Final Action filed May 22, 2007. This Amendment was entered, but an Advisory Action of June 8, 2007 maintained the final rejection. Appellants then filed a Request for Pre-Appeal Brief Review on July 5, 2007, and a Notice of Panel Decision from Pre-Appeal Brief Review mailed August 6, 2007 reopened prosecution. Prosecution was reopened with the mailing of a non-final Office Action on October 18, 2007, wherein a new secondary reference was substituted for the original secondary reference, in a three reference rejection under 35 USC §103(a). In response, a second Request for Pre-Appeal Brief Review was filed on July 5, 2007. The Notice of Panel Decision from Pre-Appeal Brief Review of November 29, 2007 indicated that the application should proceed to the Board of Patent Appeals and Interferences, which resulted in the present appeal. Thus, no amendments have been filed after the Amendment After Final Action of May 22, 2007. The attached Appendix presents the pending claims and corresponding status of each of the pending claims.

Summary of the Claimed Subject Matter

Some embodiments of the present invention according to independent Claim 1 provide a method of fabricating an array of microlenses (e.g., Figure 13A, microlenses **132**) by scanning a radiation beam (e.g., Figure 13A, radiation beam **820**) at varying amplitude through a substrate (e.g., Figure 13A, substrate **800**) that is transparent thereto into a negative photoresist layer (e.g., Figure 13A, negative photoresist layer **1310**) on the substrate to image the array of microlenses in the negative photoresist layer, as illustrated in Figure 13A.

Some embodiments of the present invention according to Claim 3 provide that the negative photoresist layer (e.g., Figure 17, negative photoresist layer **1310**) is thicker than the array of microlenses (e.g., Figure 17, microlenses **1732**) and wherein scanning

comprises scanning a radiation beam (e.g., Figure 17, radiation beam **822**) at varying amplitude through a substrate (e.g., Figure 17, substrate **800**) that is transparent thereto into the negative photoresist layer on the substrate to image a buried array of microlenses in the negative photoresist layer, adjacent the substrate, as illustrated in Figure 17.

Other embodiments of the present invention according to Claim 4 provide that the microlenses (e.g., Figure 17, microlenses **1732**) include a base and a top that is narrower than the base, as illustrated in Figure 17, wherein scanning comprises scanning a radiation beam (e.g., Figure 17, radiation beam **822**) at varying amplitude through a substrate (e.g., Figure 17, substrate **800**) that is transparent thereto into a negative photoresist layer (e.g., Figure 17, negative photoresist layer **1310**) on the substrate to image the array of microlenses in the negative photoresist layer with the bases adjacent the substrate and the tops remote from the substrate, as illustrated in Figure 17.

Other embodiments of the present invention according to Claim 5 provide that the negative photoresist layer (e.g., Figure 18, negative photoresist layer **1310**) is of variable thickness thereacross, as illustrated in Figure 18, wherein a minimum thickness of the negative photoresist layer is thicker than the microlenses (e.g., Figure 18, microlenses **1832**), wherein scanning comprises scanning a radiation beam (e.g., Figure 18, radiation beam **822**) at varying amplitude through a substrate (e.g., Figure 18, substrate **800**) that is transparent thereto into the negative photoresist layer on the substrate to image buried microlenses beneath the negative photoresist layer, adjacent the substrate, that are independent of the variable thickness of the negative photoresist layer, as illustrated in Figure 18.

Yet other embodiments of the present invention according to Claim 6 provide a method wherein the negative photoresist layer (e.g., Figure 19, negative photoresist layer **1310**) includes impurities (e.g., Figure 19, impurities **1910**) thereon, remote from a substrate (e.g., Figure 19, substrate **800**), wherein the negative photoresist layer is thicker than the microlenses (e.g., Figure 19, microlenses **1832**) and wherein scanning comprises scanning a radiation beam (e.g., Figure 19, radiation beam **822**) at varying amplitude through the substrate that is transparent thereto into the negative photoresist layer on the substrate to image buried microlenses in the negative photoresist layer, adjacent the substrate, that are not distorted by the impurities, as illustrated in Figure 19.

Yet other embodiments of the present invention according to Claim 8 provide that the negative photoresist layer is on a cylindrical platform (e.g., Figure 3, cylindrical platform **100**) and wherein scanning comprises rotating the cylindrical platform about an axis thereof (e.g., Figure 3, axis **102**, rotation arrow **104**) while simultaneously axially rastering the radiation beam (e.g., Figure 3, radiation beam **120**, axial rastering arrow **124**) at varying amplitude through the substrate that is on the cylindrical platform across at least a portion of the negative photoresist layer to image the array of microlenses (e.g., Figure 3, microlenses **132**) in the negative photoresist layer.

Grounds of Rejection to be Reviewed on Appeal

1. Are each of pending Claims 1, 3-13 and 15-18 properly rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 4,965,118 to Kodera et al. (hereinafter "Kodera") in view of U.S. Patent 6,292,255 to McCullough (hereinafter "McCullough") and U.S. Patent 6,410,213 to Raguin et al. (hereinafter "Raguin")?

Argument

I. Introduction

All of the pending claims stand rejected as allegedly being obvious. To establish a *prima facie* case of obviousness, the prior art reference or references when combined must teach or suggest all the recitations of the claims, and there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. M.P.E.P. §2143. A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR Int'l Co. v. Teleflex Inc.,* 550 U. S. 1, 15 (2007). A corollary principle is that, when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be unobvious. *Id.* at 12. If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Id.* at 13. A Court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 13. When it is necessary for a

Court to look at interrelated teachings of multiple patents, the Court must determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. *Id.* at 14.

II. Claims 1, 3-13 and 15-18 Are Unobvious Over Kodera In View of McCullough And Further In View of Raguin

Independent Claim 1 recites:

> 1. A method of fabricating an array of microlenses comprising:
> scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image the array of microlenses in the negative photoresist layer.

Thus, Independent Claim 1 recites a method of fabricating an array of microlenses comprising five interrelated recitations:

(1) scanning a radiation beam;

(2) at varying amplitude;

(3) through a substrate that is transparent thereto;

(4) into a negative photoresist layer on the substrate;

(5) to image the array of microlenses in the negative photoresist layer.

The present application, for example at Page 20, line 13-Page 21, line 12, describes various potential advantages in fabricating an array of microlenses using the five interrelated recitations. Appellants will now show that the combination of Kodera, McCullough and Raguin does not describe or suggest many of the recitations of independent Claim 1.

In particular, Kodera does not describe or suggest (1) scanning a radiation beam, (2) at varying amplitude, (3) into a negative photoresist layer on a substrate, (5) to form a latent image of the array of microlenses in the negative photoresist layer, as recited in Claim 1. Rather, as noted in Kodera Column 6, line 21-41:

> 1.2 Manufacturing method
> Most suitable material constituting respective components will be described while explaining a method of manufacturing the disk 100. First, as shown in FIG. 2, a resin mold 130, on which an uneven pattern 131 having an opposite relationship with respect to the uneven pattern corresponding to information to be recorded is formed, is

> prepared. A resin liquid 140 of the ultraviolet ray hardening type or the electron ray hardening type is painted on the resin mold 130. <u>From the side of the resin liquid 140, ultraviolet rays or electron rays 150 are irradiated, thus to harden and give form to the resin liquid 140.</u> The hardened resin layer serves as the resin layer 110. After this, the resin layer 110 is disconnected from the resin mold 130. <u>When needed, ultraviolet rays or electron rays are irradiated for the second time to complete hardening of the resin.</u> Since the resin thus hardened is subjected to three-dimensional bridging hardening, it exhibits a high heat resistance property and high solvent resistance property. (Emphasis added.)

Accordingly, in Kodera, there is no need to scan a radiation beam at a varying amplitude, because Kodera's flexible optical information recording medium is patterned by <u>molding</u> a resin onto a substrate having a pattern on it, as shown, for example, in Kodera Figures 1, 2, 4A and 4B. Rather than scanning, <u>flooding</u> of radiation is used to simply harden the molded resin, as noted in Kodera Column 8, lines 33-43. The flooding arrows **150** of Kodera Figure 2 and Figure 5 confirm that the scanning is not used and, in fact, there would be no need for scanning in Kodera for the reasons described above.

At the top of Page 4, the Office Action concedes:

> The difference between the claims and Kodera is that Kodera does not disclose that the radiation beam amplitude is varied (claims 10, 27, and 42).

However, Appellants have shown above that Kodera fails to disclose far more than varying the amplitude of radiation beam, in that the Kodera does not describe or suggest (1) scanning a radiation beam (2) at varying amplitude. Moreover, Kodera's radiation does not (5) form a latent image of the array of microlenses as recited in Claim 1. Rather, the radiation beam is merely used to harden the resin layer, but the array of microstructures is already formed mechanically by molding onto a patterned supporting layer.

In fact, Kodera does not even appear to use a photoresist whether positive or (4) negative, because Kodera's "resin liquid" does not appear to be capable of producing an image-wise pattern, and is not subjected to a development process. Rather, the resin liquid is simply hardened by irradiation of ultraviolet rays or electron rays, as described in the above-quoted passages of Kodera. Accordingly, Kodera would appear to be incapable of imaging an array of microlenses, even if a radiation beam was scanned at

varying amplitude. Kodera therefore does not describe or suggest recitations (1), (2), (4) or (5) of Claim 1.

In an unsuccessful attempt to supply the missing teachings, the Office Action cites McCullough. However, McCullough relates to a method and apparatus for varying the exposure dose during semiconductor integrated circuit manufacturing as a function of distance in a scan direction, to compensate for the signature of the photolithographic device and thereby reduce line width variation in the scan direction. Note the McCullough Abstract:

> In a scanning photolithographic device used in the manufacture of semiconductors, a method and apparatus for varying the exposure dose as a function of distance in the scan direction compensating for the signature of the photolithographic device for reducing linewidth variation in the scan direction. The linewidth in the scan direction may vary for a particular device or tool for a variety of reasons. This variation or signature is used in combination with a photosensitive resist response function to vary the exposure dose as a function of distance in a scan direction, substantially reducing the linewidth variation. A dose control varies the exposure dose as a function of distance in a scan direction to correct linewidth variations caused by characteristics of the photolithographic system. Linewidth variations as a function of distance in the direction of scan are substantially reduced, resulting in more consistent and improved feature or element sizes. (Emphasis added.)

Accordingly, McCullough relates to conventional semiconductor fabrication in which variations of linewidths are reduced by compensating the dose in exposing a photoresist. In fact, McCullough is designed to provide uniform linewidths by varying exposure dose, so that McCullough teaches away from (2) varying amplitude of a radiation beam to (5) image the array of microlenses, as recited in Claim 1. This is reinforced by the other cited passages of McCullough, such as Column 2, lines 29-31, and Column 6, lines 1-17. Thus, although McCullough teaches varying an amplitude of a scanned laser, it does so for totally different reasons in a totally different context.

The Office Action concedes in the middle of Page 4 that:

> The difference between the claims and Kodera in view of McCullough is that Kodera in view of McCullough does not disclose that the optical microstructures formed are an array of microlenses and that the microstructure master is a microlens array master.

Appellants have shown above that Kodera in view of McCullough fails to disclose much more than this. Nonetheless, in another unsuccessful attempt to supply the missing

teachings, the Office Action cites Raguin. However, Raguin clearly describes the use of positive photoresist, and clearly illustrates at Figure 8 that imaging through the substrate does not take place. Moreover, Raguin describes at Figures 8(a) and 8(b) the imaging through a mask **84**. Thus, Raguin describes the formation of microlenses as in the preamble of Claim 1 and uses a radiation beam, but does not supply any of the other missing teachings.

In summary, the Office Action appears to erroneously interpret the primary reference. In particular, Kodera provides flooding and uses mechanical molding to form various microstructures in a resin layer that is not even a photoresist. Light is merely used to flood the layer to enable it to be hardened and cured. Moreover, the new secondary reference McCullough teaches controlling an exposure dose as a function of distance in a scan direction to compensate for the signature of a photolithographic device, to thereby reduce linewidth variation in a semiconductor device and, accordingly, teaches away from varying the amplitude of the scanned radiation beam in order to image an array of microlenses. Accordingly, the primary and secondary references both teach away from combining certain known elements, so that discovery of a successful means of combining them by Appellants is more likely to be unobvious, as recently held by the U.S. Supreme Court. Moreover, although Raguin illustrates forming an array of microlenses, Raguin does not appear to provide any exposure through the substrate by scanning a radiation beam at varying amplitudes through a substrate into a negative photoresist layer on the substrate.

In conclusion, although Claim 1 is short, it recites five interrelated recitations that allow an array of microlenses to be fabricated. In an attempt to show obviousness, the Office Action has chosen three diverse references that individually teach away from their combination and, even if combined, do not suggest these five interrelated recitations. Thus, the Office Action has merely shown that the elements were individually independently known. However, they were known in such diverse environments that one of skill in the art would not somehow combine them to obtain the recitations of Claim 1 absent the hindsight that is provided by reading Claim 1. The fact that the prior art teaches away from the combination provides further evidence of unobviousness of Claim 1.

Appellants also wish to note that uncited prior art of record provides secondary considerations of nonobviousness in the form of U.S. Patent 7,092,165 to Morris et al., assigned to Corning Incorporated, entitled *"Microlens Arrays Having High Focusing Efficiency"*. This patent relates to fabricating an array of microlenses as does Claim 1. As noted in the Abstract of this patent:

> Microlens arrays (**105**) having high focusing efficiencies are provided. The high focusing efficiencies are achieved by accurately producing the individual microlenses making up the array at high fill factors. Arrays of positive microlenses are produced by forming a master having a concave surface-relief pattern (**101**) <u>in a positive photoresist (**21**) using direct laser writing</u>. Through this approach, the problems associated with the convolution of a finite laser beam with a desired profile for a microlens are overcome. The microlens arrays of the invention have focusing efficiencies of at least 75%. (Emphasis added.)

Thus, the Abstract points to the use of positive photoresists. As noted at Column 3, lines 1-15 of Morris et al.:

> Processes for producing microlens arrays using direct laser writing in a photoresist are known in the art. See commonly-assigned PCT Patent Publication No. WO 99/64929, Gale et al., U.S. Pat. No. 4,464,030, and *Micro-Optics: Elements, systems and applications*, Hans P. Herzig, ed., Taylor & Francis, Bristol, Pa., 1997, pp. 53 152. <u>The photoresist of choice for such processes is a positive photoresist since compared to negative photoresists, positive photoresists are more widely available, have been subject to more intensive research and development work by photoresist manufacturers, and generally have higher resolution</u>. However, as discussed in detail below, prior to the present invention, it has not been possible to produce arrays of positive microlenses having high focusing efficiencies at high fill factors using positive photoresists. (Emphasis added.)

Yet, despite this clear teaching in the prior art, Appellants have found that, indeed, negative photoresist can be used when the microlens arrays are imaged through a substrate that is transparent thereto. Moreover, as noted above, Applicants have found that backside imaging through a transparent substrate into negative photoresist can provide many advantages. For at least these additional reasons, independent Claim 1 is patentable over Kodera in view of McCullough and in further view of Raguin.

The dependent claims are patentable at least per the patentability of independent Claim 1 from which they all depend. Moreover, many of the dependent claims provide separate bases for patentability.

For example, dependent Claim 3 recites that:

> 3. A method according to Claim 1 wherein the negative photoresist layer is thicker than the array of microlenses and wherein scanning comprises scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image a buried array of microlenses in the negative photoresist layer, adjacent the substrate.

Note the present application, Page 18, line 27-Page 19, line 19:

> As shown in Figure 16, some embodiments of the invention arise from the recognition that it may be difficult to form these shapes using conventional positive photoresist **1610** and conventional photoresist-incident ("front-side") exposure. In particular, as shown in Figure 16, when using positive photoresist **1610** and front-side exposure **1630** as is conventionally used, for example, in the semiconductor industry, the radiation acts as a "punch" to image the outer surface of the photoresist **1610** opposite the substrate **1600**. This relationship tends to form images **1620a**, **1620b** which are the opposite in shape as those which may be desired for optical microstructures (Figure 15). Moreover, as also shown in Figure 16, relatively shallow images **1620c** may exist only at the exposed surface of the photoresist layer **1610** and may be washed away during development. See, for example, Paragraphs 56-67 of the above-cited U.S. Published Patent Application 2002/0034014.
>
> In sharp contrast, as was shown, for example, in Figures 13A and 13B, back-side imaging combined with negative photoresist, according to some embodiments of the invention, can produce optical microstructures **132'** that include bases **1302** adjacent the substrate **800** and tops **1304** that are narrower than the bases **1302**, remote from the substrate **800**. Moreover, as shown in Figure 17, embodiments of the present invention that image through the substrate **800** and use negative photoresist **1310** can provide a photoresist layer **1310** that is thicker than the desired heights of the optical microstructures **1732**, so that the radiation beam may be impinged through the substrate **800** into the negative photoresist layer **1310** to image buried optical microstructures **1732** in the negative photoresist layer **1310**, adjacent the substrate **800**. As long as the negative photoresist layer **1310** is at least as thick as the thickest optical microstructure **1732** that is desired to be fabricated, relatively thick and relatively thin microstructures may be fabricated in one negative photoresist layer, adjacent the substrate **800**, and may not be washed away during the development process.

For at least these reasons, Claim 3 is independently patentable.

Moreover, Claim 4 recites:

> 4. A method according to Claim 1 wherein at least some of the microlenses include a base and a top that is narrower than the

> base and wherein scanning comprises scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image the array of microlenses in the negative photoresist layer with the bases adjacent the substrate and the tops remote from the substrate.

The above-quoted portions of the specification from Pages 18-19 provide further proof of the independent patentability of Claim 4, as well.

Claim 5 recites:

> 5. A method according to Claim 1 wherein the negative photoresist layer is of variable thickness thereacross, wherein a minimum thickness of the negative photoresist layer is thicker than the microlenses and wherein scanning comprises scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image buried microlenses beneath the negative photoresist layer, adjacent the substrate, that are independent of the variable thickness of the negative photoresist layer.

The present application notes at Page 19, lines 20-28:

> Figure 18 illustrates other embodiments of the present invention that may use negative photoresist **1310** and imaging by a laser beam **822** through the substrate **800**. As shown in Figure 18, when forming a layer of negative photoresist **1310** over a large substrate **800**, the photoresist may have non-uniform thickness. However, as shown in Figure 18, as long as the minimum thickness of the negative photoresist layer **1310** is thicker than the optical microstructures **1832**, then buried optical microstructures **1832** may be imaged in the photoresist layer **1310** of variable thickness, adjacent the substrate **800**, that may be independent of the variable thickness of the negative photoresist layer **1310**.

The cited art does not describe or suggest any of these recitations. Accordingly, Claim 5 is also independently patentable.

Moreover, Claim 6 recites:

> 6. A method according to Claim 1 wherein the negative photoresist layer includes impurities thereon, remote from the substrate, wherein the negative photoresist layer is thicker than the microlenses and wherein scanning comprises scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image buried microlenses in the negative photoresist layer, adjacent the substrate, that are not distorted by the impurities.

As described at Page 19, line 29-Page 20, line 4 of the present application:

> Other potential advantages of the use of back-side exposure and negative photoresist, according to some embodiments of the present invention, are shown in Figure 19. As shown in Figure 19, the negative photoresist layer **1310** may include impurities **1910** thereon. When using conventional front-side imaging rather than back-side imaging, these impurities **1910** may interfere with the front-side imaging. However, when using back-side imaging as shown in Figure 19, the laser beam **822** need not pass through or focus on, the outer surface **1310a** of the negative photoresist **1310**, remote from the substrate **800**. Thus, impurities **1910** need not impact the formation of optical microstructures **1832**. Accordingly, imaging may take place in a non-clean room environment in some embodiments of the present invention.

The recitations of Claim 6 are not described or suggested in the cited art, and the above-quoted portions of the specification provides evidence of independent patentability of Claim 6. Accordingly, Claim 6 is independently patentable.

Moreover, Claim 8 recites:

> 8. A method according to Claim 1 wherein the negative photoresist layer is on a cylindrical platform such that the substrate is on the negative photoresist layer remote from the cylindrical platform, and wherein scanning comprises:
>
> rotating the cylindrical platform about an axis thereof while simultaneously axially rastering the radiation beam at varying amplitude through the substrate that is on the cylindrical platform across at least a portion of the negative photoresist layer to image the array of microlenses in the negative photoresist layer.

The Office Action has cited McCullough as describing scanning/rotating. However, as was already described above, McCullough teaches controlling an exposure dose as a function of distance in a scan direction to compensate for the signature of the photolithographic device, to thereby reduce linewidth variation in a semiconductor device and, accordingly, teaches away from varying amplitude of the scanned radiation beam in order to image an array of microlenses. Accordingly, Claim 8 is independently patentable.

The remaining dependent claims are patentable at least per the independent claims from which they depend.

III. Conclusion

As shown above, Appellants have discovered unique methods of fabricating arrays of microlenses. The claimed invention can provide unique advantages, as was described throughout the application. The Office Action continues to selectively pick and choose various features from different patents, despite their teachings, and teachings away, in an unsuccessful and impermissible attempt to reconstruct the claimed invention. For at least these reasons, Appellants respectfully request withdrawal of the rejection of independent Claim 1. Moreover, Appellants have also shown that many of the dependent claims are separately patentable.

In light of the above discussion, Appellants submit that the pending claims are directed to patentable subject matter and, therefore, request reversal of the rejections of the claims and passing of the application to issue.

It is not believed that an extension of time and/or additional fee(s) are required, beyond those that may otherwise be provided for in documents accompanying this paper. In the event, however, that an extension of time is necessary to allow consideration of this paper, such an extension is hereby petitioned for under 37 C.F.R. §1.136(a). Any additional fees believed to be due in connection with this paper may be charged to Deposit Account No. 50-0220.

Respectfully submitted,

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CERTIFICATION OF TRANSMISSION

I hereby certify that this correspondence is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4) to the U.S. Patent and Trademark Office on January 7, 2008.

Susan E. Freedman
Date of Signature: January 7, 2008

APPENDIX A

Pending Claims U.S. Serial No. 10/661,917
Filed September 11, 2003

1. (Previously Presented) A method of fabricating an array of microlenses comprising:

scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image the array of microlenses in the negative photoresist layer.

2. (Canceled)

3. (Previously Presented) A method according to Claim 1 wherein the negative photoresist layer is thicker than the array of microlenses and wherein scanning comprises scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image a buried array of microlenses in the negative photoresist layer, adjacent the substrate.

4. (Previously Presented) A method according to Claim 1 wherein at least some of the microlenses include a base and a top that is narrower than the base and wherein scanning comprises scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image the array of microlenses in the negative photoresist layer with the bases adjacent the substrate and the tops remote from the substrate.

5. (Previously Presented) A method according to Claim 1 wherein the negative photoresist layer is of variable thickness thereacross, wherein a minimum thickness of the negative photoresist layer is thicker than the microlenses and wherein scanning comprises scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image buried microlenses beneath the negative photoresist layer, adjacent the substrate, that are independent of the variable thickness of the negative photoresist layer.

6. (Previously Presented) A method according to Claim 1 wherein the negative photoresist layer includes impurities thereon, remote from the substrate, wherein the negative photoresist layer is thicker than the microlenses and wherein scanning comprises scanning a radiation beam at varying amplitude through a substrate that is transparent thereto into a negative photoresist layer on the substrate to image buried microlenses in the negative photoresist layer, adjacent the substrate, that are not distorted by the impurities.

7. (Original) A method according to Claim 1 wherein the substrate is a flexible substrate.

8. (Previously Presented) A method according to Claim 1 wherein the negative photoresist layer is on a cylindrical platform such that the substrate is on the negative photoresist layer remote from the cylindrical platform, and wherein scanning comprises:

rotating the cylindrical platform about an axis thereof while simultaneously axially rastering the radiation beam at varying amplitude through the substrate that is on the cylindrical platform across at least a portion of the negative photoresist layer to image the array of microlenses in the negative photoresist layer.

9. (Original) A method according to Claim 8 further comprising simultaneously translating the cylindrical platform and/or radiation beam axially relative to one another.

10. (Previously Presented) A method according to Claim 9 further comprising simultaneously continuously varying the amplitude of the radiation beam.

11. (Original) A method according to Claim 1 wherein the substrate is at least about one square foot in area.

12. (Previously Presented) A method according to Claim 1 wherein scanning is performed continuously on the substrate for at least about 1 hour.

13. (Previously Presented) A method according to Claim 1 wherein scanning is performed continuously on the substrate for at least about 1 hour to fabricate at least about one million microlenses.

14. (Canceled)

15. (Previously Presented) A method according to Claim 1 further comprising:

developing the microstructures that are imaged in the negative photoresist layer to provide a microlens array master.

16. (Original) A method according to Claim 1 wherein the substrate is cylindrical, ellipsoidal or polygonal in shape.

17. (Previously Presented) A method according to Claim 1 further comprising translating the substrate and/or radiation beam relative to one another while scanning the radiation beam.

18. (Previously Presented) A method according to Claim 15 further comprising:

forming a plurality of second generation stampers directly from the master; and

forming a plurality of third generation microlens array end products directly from a stamper.

19.-105. (Canceled)

APPENDIX B – EVIDENCE APPENDIX

(NONE)

APPENDIX C – RELATED PROCEEDINGS

(NONE)